

LEAD INDUSTRIES ASSOCIATION

480 LEXINGTON AVENUE

NEW YORK 17, N. Y.

October 19, 1948

To Members of the Lead Industries Association:

SUBJECT: RED LEAD TECHNICAL LETTER NO. 3

We are enclosing a copy of Red Lead Technical Letter No. 3, "Red Lead Primers for Atmospheric Exposure" which has just been issued by the Red Lead Technical Committee of the Lead Industries Association. It is based on the research programs which have been conducted by the Committee during the past few years and on actual performance experience.

The Letter will be circulated, within the next week, to between 6,000 and 7,000 paint manufacturers and specifiers and buyers of paints for the protection of structural steel.

We are sending you a copy merely to keep you informed of the activities of the Association in all fields.

Very truly yours,

Robert L. Frazier
Secretary



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RED LEAD PRIMERS

for

ATMOSPHERIC EXPOSURE

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Red Lead Technical Committee
LEAD INDUSTRIES ASSOCIATION
 420 LEXINGTON AVENUE
 NEW YORK 17, N. Y.

Foreword

THE policy of the Lead Industries Association is to encourage the proper and economical use of lead products of all types. Through its Red Lead Technical Committee, comprised of representatives of the red lead and paint industries, it endeavors to furnish suggested formulations for high performance red lead base primers for the protection of iron and steel. The Committee also conducts extensive research programs through member companies and enters into cooperative investigations with many government agencies and industry. In planning these cooperative projects, the Red Lead Technical Committee takes into consideration the latest pertinent developments in pigments, vehicles and techniques of application.

Red Lead Technical Letters are issued from time to time by the Lead Industries Association to acquaint manufacturers, specifiers and users of paints with the latest developments in metal protective paint primers.

The red lead base formulations that follow have been selected on the basis of outstanding performance under actual field conditions. These are suited for use under a wide variety of good quality topcoat paints based on oil or synthetic type vehicles. They are presented here as typical of some of the possibilities of red lead primers. Information on specific paint problems can be obtained from the Lead Industries Association or from the member companies listed below.

Manufacturers of Red Lead

THE EAGLE-PICHER COMPANY American Building, Cincinnati 1, Ohio

W. P. FULLER & COMPANY 301 Mission Street, San Francisco 1, California

Beta, Beta, Fresno, Los Angeles, Oakland, Phoenix, Portland (Ore.), Sacramento, Salt Lake City, San Diego, Seattle, Spokane, Tacoma, Yakima (Wash.)

THE GLENN COMPANY 1396 Union Commerce Building, Cleveland 14, Ohio

Adams, Boston, Minneapolis, New York, North Bergen (N. J.), San Francisco, Adams & Kling Division, Chicago, American Paint Works Division, New Orleans, Campbell Paint & Varnish Division, St. Louis, McKee Paint & Varnish Division, Chicago, A. Wilhelm Company Division, Reading, Canadian Division, Toronto, The Chemical & Pigment Company, Baltimore, Collierville (Ill.), Oakland, Eastern Lead Company, Scranton, Metals Refining Company (representative), Detroit, Hammond (Ind.), Kansas City (Mo.), New Orleans, New York, Philadelphia, Pittsburgh, St. Louis, Ft. Thomas (Ky.)

HAMMOND LEAD PRODUCTS, INC. First Trust Building, Hammond, Indiana
430 Lexington Avenue, New York 17, N. Y.

NATIONAL LEAD COMPANY 111 Broadway, New York 6, N. Y.

Buffalo, Chicago, Cincinnati, Cleveland, Pittsburgh, St. Louis, San Francisco, National Lead Company of Mass., Boston, John T. Lewis & Son Company, Philadelphia

RED LEAD PRIMERS for ATMOSPHERIC EXPOSURE

Red Lead Oil Vehicle Primers

PRIMERS based on these formulas are indicated for use on bridges, similar structural steel and other ferrous metal surfaces. They are suitable for priming and body coats, either in the shop or field, where good resistance to the corrosive effects of usual atmospheric environment is required. The vehicle solids, consisting entirely of linseed oil offer the best means of wetting the metal and obtaining an intimate bond of the paint with the surface, despite the presence of limited amounts of corrosion products found impractical to remove.

FORMULA 3-1

A red lead - iron oxide multiple pigment linseed oil paint.

Composition	Percent	Pounds	Gallons
PIGMENT: Red Lead	80.0	608	9.42
Siliceous Iron Oxide (75-85% FeO ₂)	20.0	232	6.08
Magnesium Silicate	20.0	232	6.75
	100.0		
VEHICLE: Raw Linseed Oil	64.0	848	44.85
Linseed Oil (Z-8 Body)	5.0	36	8.30
Thinner and Drier**	31.0	168	25.70
	100.0	1794	100.00

Pigment = 885
Vehicle = 335
Wt./Gal. = 17 lbs.
PV = 335

* The addition of aluminum amounts up to 0.5% by weight of pigment is necessary to maintain requirements of the pigment in the vehicle.
** Drier: 0.5% lead, 0.05% manganese, 0.005% cobalt based on oil content.

FORMULA 3-2

(This is Type I of the Pending Revision of Federal Specification TT-P-86)

Composition	Percent	Pounds	Gallons
PIGMENT: Red Lead (97% Grade)	99.7	1800	25.08
Aluminum Silicate	0.3	5.5	0.08
	100.0		
VEHICLE: Raw Linseed Oil	48.0	308	34.80
Pale Heat Treated Linseed Oil (Z-8 Viscosity)	17.0	90.8	11.80
Mineral Spirits	20.0	154.5	20.30
Drier*	5.0	26.4	3.18
	100.0	2308.2	100.00

Pigment = 77.88
Vehicle = 22.22
Wt./Gal. = 34 lbs.
PV = 205

* Federal Specification TT-P-86, Type I

Red Lead Oil-Varnish Vehicle Primers

FORMULA 8-3

A red lead multiple pigment paint from which good service has been obtained on structural steel.

	Composition	Percent	Parts	Gallons
PIGMENT:	Red Lead (97% Grade)	75.0	100%	12.50
	Siderous Iron Oxide (75-88% Fe ₂ O ₃)	24.0	30%	3.10
	Aluminum Silicate	0.5	0.5	0.05
		100.0		
VEHICLE:	Raw Linseed Oil	87.0	88%	42.10
	Spur Varnish (F. S. TT-V-12 Bn.) ¹	12.0	12%	12.10
	Thinner and Drier	1.0	1%	1.00
		100.0	100.0	100.00

Pigment = 75%
 Vehicle = 88%
 Wt./Vol. = 10 Bn.
 TV = 82%

¹ 50-60% linseed oil, 40% drier and 0.5% which based on oil content.
 * Data: 0.5% lead, 0.5% magnesium and 0.5% which based on oil content.

FORMULA 9-4

A red lead - iron oxide multiple pigment paint which will dry much faster than Formula 8-1, page 6.

	Composition	Percent	Parts	Gallons
PIGMENT:	Red Lead (97% Grade)	60.0	60%	6.44
	Siderous Iron Oxide (75-88% Fe ₂ O ₃)	30.0	30%	3.10
	Magnesium Silicate	10.0	10%	1.00
		100.0		
VEHICLE:	Linseed Oil	80.0	80%	38.40
	Varnish (F. S. TT-V-12 Bn.)	10.0	10%	10.40
	Thinner and Drier ¹	10.0	10%	10.40
		100.0	171.1	100.00

Pigment = 60%
 Vehicle = 80%
 Wt./Vol. = 17 Bn.
 TV = 80%

* Data: 0.5% lead, 0.5% magnesium, 0.5% which based on oil content.

FORMULA 8-5

(This is Type II of the Pending Revision of Federal Specification TT-P-84)

Formula 8-5 is designed for use where painting schedules require handling and reworking in 10 hours. Free based oil is present in this paint for better workability to obtain more intimate bonding with the surface.

	Composition	Percent	Parts	Gallons
PIGMENT:	Red Lead (97% Grade)	60.0	70%	10.00
	Iron Oxide (83% Fe ₂ O ₃)	10.0	10%	1.00
	Magnesium Silicate	10.0	10%	1.00
	Mica	4.0	4%	0.50
	Aluminum Silicate	0.5	0.5%	0.05
		100.0		
VEHICLE:	Alkyd Resin ¹	57.0	57%	10.00
	Raw Linseed Oil	20.0	20%	20.00
	Mineral Spirits	14.1	14%	12.00
	Lead Naphthenate Drier (54% Pb)	6.0	6%	0.44
	Cobalt Naphthenate Drier (66% Co)	0.5	0.5%	0.05
		100.0	173.0	100.00

Pigment = 60.5%
 Vehicle = 39.5%
 Wt./Vol. = 17 Bn.
 TV = 80%

* Mixture of hard based modified phenyl plastic alkyd (54% plastic alkyd), 10% alkyd and 36% which based on oil content.

FORMULA 3-6

This red lead-iron oxide paint is designed for use as a shop or field coat on new work as well as in general maintenance.

Composition	Percent	Pounds	Gallons
PIGMENT: Red Lead (F. S. TT-R-191a, Type I, Grade C).....	75.9	1340	14.80
Iron Oxide (F. S. TT-M-331)	24.7	407	11.70
Aluminum Stearate (N. S. SS-A-12a)	9.8	5	0.70
	100.8		
VEHICLE: Raw Linseed Oil	95.8	398	44.80
Alkyd Resin (U. S. Maritime Commission Specification SS-MC-501, Type II)	83.8	184	28.80
Lead Naphthenate Drier (345 Pb)	0.8	4.8	0.80
Cobalt Naphthenate Drier (85 Co)	0.8	1.8	0.80
	100.8	1300.4	100.00

Pigment = 75%
Vehicle = 25%
Wt./Gal. = 22 lbs.
PV = 22%

Red Lead Synthetic Vehicle Primers

FORMULA 3-7

This red lead multiple pigment paint is designed as a primer for paint systems or surfaces exposed to marine atmospheres such as ship superstructures, bridges and dock installations. As with other synthetic vehicle primers, application on steel free from corrosion products and other foreign matter is essential for the best performance.

Composition	Percent	Pounds	Gallons
PIGMENT: Red Lead (97% Grade)	53.8	518	7.00
Zinc Oxide	10.8	94	2.08
Zinc Yellow (Zinc Chromate)	10.8	94	2.27
Iron Oxide (85% Fe ₂ O ₃)	7.8	65.8	1.80
Magnesium Silicate	10.8	94	2.96
Disinfectant Silica	8.8	75.8	8.80
	100.8		
VEHICLE: (L.I.A. No. 27)*			
Dehydrated Castor Oil Alkyd	100.8	398	77.80
	100.8	1302.1	100.00

Pigment = 61.8%
Vehicle = 38.2%
Wt./Gal. = 15 lbs.
PV = 40%

* L.I.A. Vehicle No. 27

Dehydrated Castor Oil Fatty Acids (Infrared)	94.80
Oleic Acid	12.8
Phthalic Anhydride	10.8
Isolated Styrene	84.8
	100.80

Cooking Procedure: Heat first three items under cover and O₂ gas to 260°F. in 40 minutes. Shortly increase to 475°F. and hold at temperature for approximately 140 minutes. Cool and reduce.

Non-Volatile = 86.8% by wt.
Viscosity = 2 Centistokes (27°F.)
Ash Number = 8-10 (on solids)
Phthalic Anhydride (Weight of Solids) = 80%

FORMULA 8-8

(This is Type III of the Pending Revision of Federal Specification TT-P-86)

This synthetic vehicle paint was formulated for thoroughly cleaned iron and steel surfaces and for touch-up work where drying within a six-hour period is desired. It is recommended for use on smooth steel, particularly as an industrial primer for priming articles fabricated at the factory, such as railroad cars, window sash, air-conditioning conduits, etc. This paint is also well suited as a fast drying general maintenance primer for touch-up work on thoroughly cleaned steel.

Composition	Pound	Pound	Grains
PIGMENT: Red Lead (97% Grade)	88.7	1575	17.50
Aluminum Silicate	0.3	0.5	0.05
	100.0		
VEHICLE: Alkyd Resin ^a	84.0	882.5	67.50
Aromatic Petroleum Spirits	14.5	90	12.70
Cobalt Naphthenate (65 Co)	0.5	1.5	0.50
Antioxidants and Wetting Agents	1.0	7.5	0.50
	100.0	1000.5	100.00

Pigment = 67.50
Vehicle = 86.75
Wt./Gal. = 10 lbs.
PV = 385

* This alloy is identical to that specified in the vehicle of Formula 8-5, on page 4.

FORMULA 8-9

(This is Type IV of the Pending Revision of Federal Specification TT-P-86)

This formulation was designed primarily as an anticorrosive paint for total immersion in salt water. For this application a dry film thickness of approximately 5 mils (5-6 coats) is suggested.

This paint is also suitable as a primer on iron and steel surfaces exposed to the atmosphere, particularly under conditions of high humidity. In addition to its excellent water impermeability, this paint has good resistance to alkaline environments.

Water storage tanks, structural work on dams, equipment in bottling plants, laundrys and others are typical of steel surfaces on which this paint is effective as a protective coating. This paint dries to a tack free film in 4 hours.

Clean surfaces, free from rust and rust scale, are required to insure the best performance.

Composition	Pound	Pound	Grains
PIGMENT: Red Lead (97% Grade)	85.0	880	12.50
Diatomaceous Silica	0.5	80.0	0.50
Magnesium Silicate	0.5	74	0.50
Aluminum Silicate	0.40	4.4	0.05
	100.0		
VEHICLE: Phenolic Varnish ^a	74.0	425	67.50
Aromatic Petroleum Spirits	22.4	136.7	17.70
Dipentene	2.75	10	0.50
Antioxidants	0.5	0.5	0.07
Lead Naphthenate (50% Pb)	0.50	1.4	0.15
Cobalt Naphthenate (65 Co)	0.05	0.5	0.04
Manganese Naphthenate (50 Mn)	0.05	0.5	0.04
	100.00	1000.0	100.00

Pigment = 86.00
Vehicle = 84.10
Wt./Gal. = 17 lbs.
PV = 425

* Phenolic Varnish

Phenolic Resin (100% type, primary amine phenol-formaldehyde resin)	50.00
Form Co. (P. & T. Co.)	10.00
Alcohol Solvent (P. & T. Co., Grade 1)	10.00
	100.00

Coating Procedure: Heat all the resin and oil to 400°F. in 45 minutes. Hold the temp. at this temperature long enough (15-20 minutes) to allow the alcohol solvent to be driven off to the specified solids content. Water and dry with infrared light.

Oil Solvent	10.00	Color (Hatch)	10.00	Phenolic Resin	10.00
Form Co. (P. & T. Co.)	10.00	Wt./Gal.	10.00	Alcohol Solvent	10.00
Phenolic (P. & T. Co.)	10.00				

FORMULA S-10

This is a general purpose primer that has performed especially well in marine atmospheres.
This paint should be applied on thoroughly cleaned surfaces.

	Composition	Percent	Pounds	Gallons
PIGMENT:	Red Lead (97% Grade)	85.0	875	7.77
	Basic Lead Chromate	10.0	112	4.48
	Zinc Oxide	10.0	105	2.25
	Magnesium Silicate	10.0	105	4.48
	Diatomaceous Silica	5.0	52.7	2.34
		100.0		
VEHICLE:	Dehydrated Castor Oil Alkyd*	100.0	885	78.00
		100.0	1041.7	100.00

Pigment = 94.65
Vehicle = 85.85
Wt./Gal. = 18.4 lbs.
PV = 405

* The preparation and properties of this vehicle are described in detail under Formula S-9 on page 8.

FORMULA S-11

(U. S. Maritime Commission Specification 52-MC-301)

When applied to clean steel this primer will give excellent service when exposed to the atmosphere, particularly in marine environments.

	Composition	Percent	Pounds	Gallons
PIGMENT:	Red Lead (F.S. TT-P-181a, Type I, Grade C)	85.4	880	8.14
	Zinc Yellow (F.S. TT-Z-415, Type I)	10.2	70	2.51
	Mica	9.4	85	2.41
	Indian Red	1.4	10	0.30
	Magnesium Silicate (52-MC-302, Type I)*	23.3	100	6.70
	Aluminum Stearate	0.3	2	0.34
		100.0		
VEHICLE:	Alkyd Resin (52-MC-301, Type I)*	80.0	415	32.80
	Aromatic Naphtha (Type III)	10.7	105	14.00
	Petroleum Spirits (F.S. TT-T-301a, Grade II)	17.3	110	17.00
		100.0	1217	100.00

Note: Litharge may be added as drier up to 6 pounds per 100 gallons.

Pigment = 885
Vehicle = 485
Wt./Gal. = Not under 12.5 lbs.
PV = 325

* 52-MC-301 - A based oil modified glyceryl phthalate alkyd.

Non-Volatile = 70 ± 1%
Wt./Gal. = 8 lbs.
Potentially Acidifiable = not under 500